GIS Data Acquisition & Visualization in a 3D World for Regional Water Quality, Hazardous Waste and Cultural Resource Screening

U.S. Army Corps of Engineers

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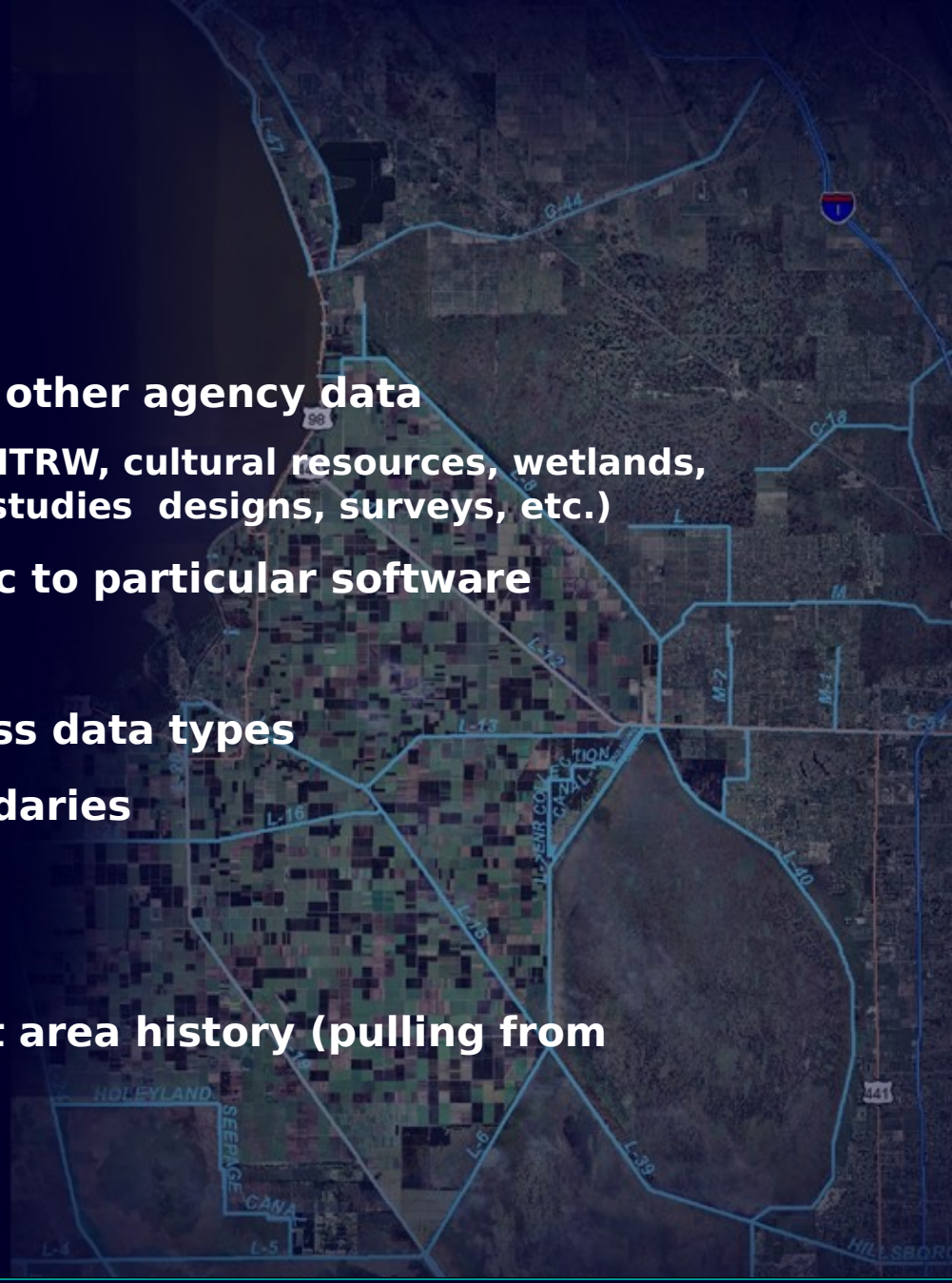
Engineering Research and Development Center

System-Wide Water Resources Program
SWWRP

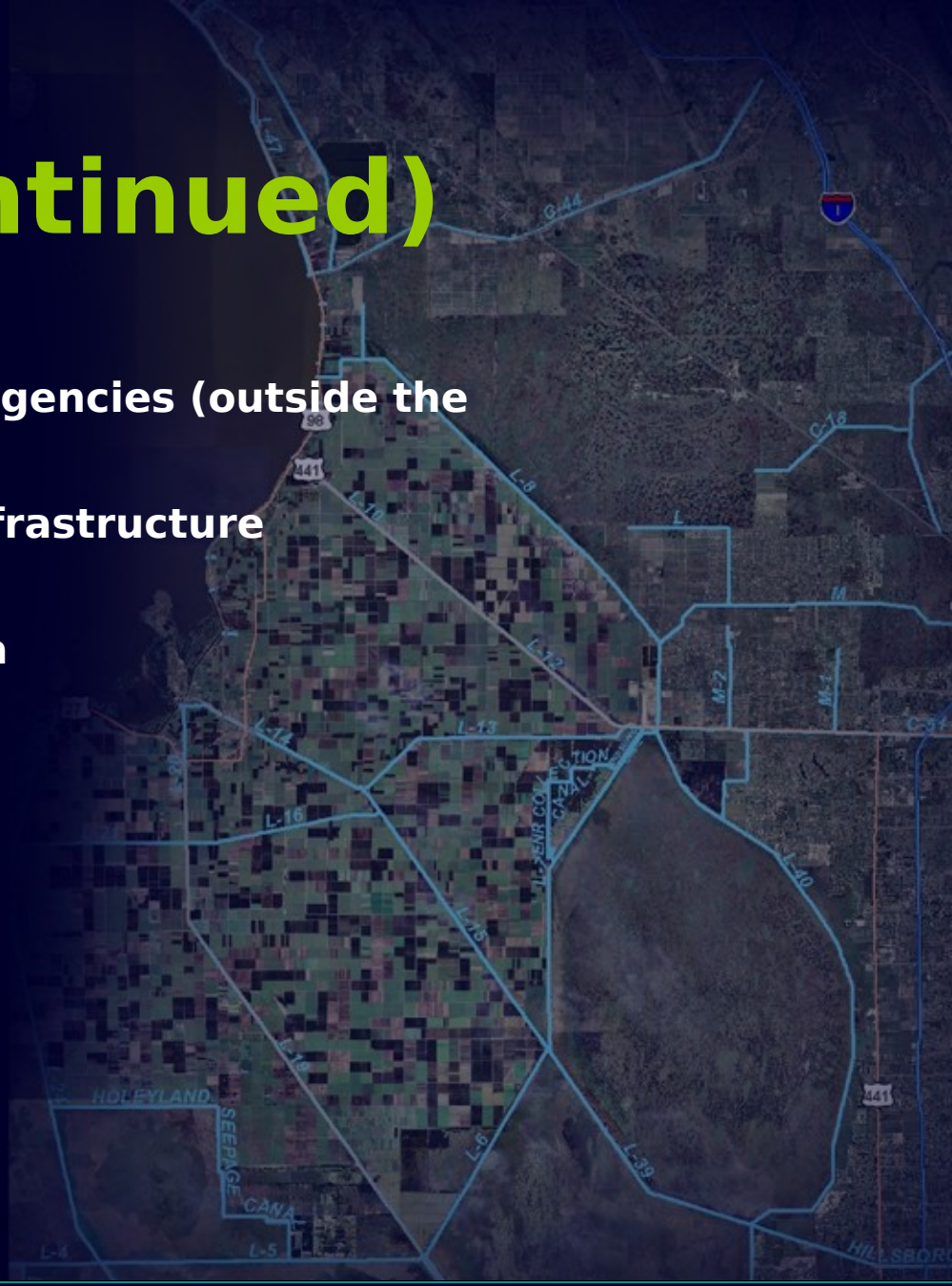
The Need

- **Quick Access To – Corps and other agency data**
  - **Geotechnical, water quality, HTRW, cultural resources, wetlands, endangered species, project studies designs, surveys, etc.)**
- **No license constraints specific to particular software**
- **Limited expertise to get data**
- **Consistent expectations across data types**
- **Data tailored to project boundaries**
- **Minimal system maintenance**
- **Reduce data replication**
- **Streamlined access to project area history (pulling from disparate data sources)**
- **Most recent data available**



The Need (continued)

- Access required by multiple agencies (outside the Corps)
- Access data using existing infrastructure datasets/tools
- Central access to project data
  - History
  - Project files
  - Water Quality
  - Project boundaries
  - Cultural Resources
  - Endangered Species
  - Other related data

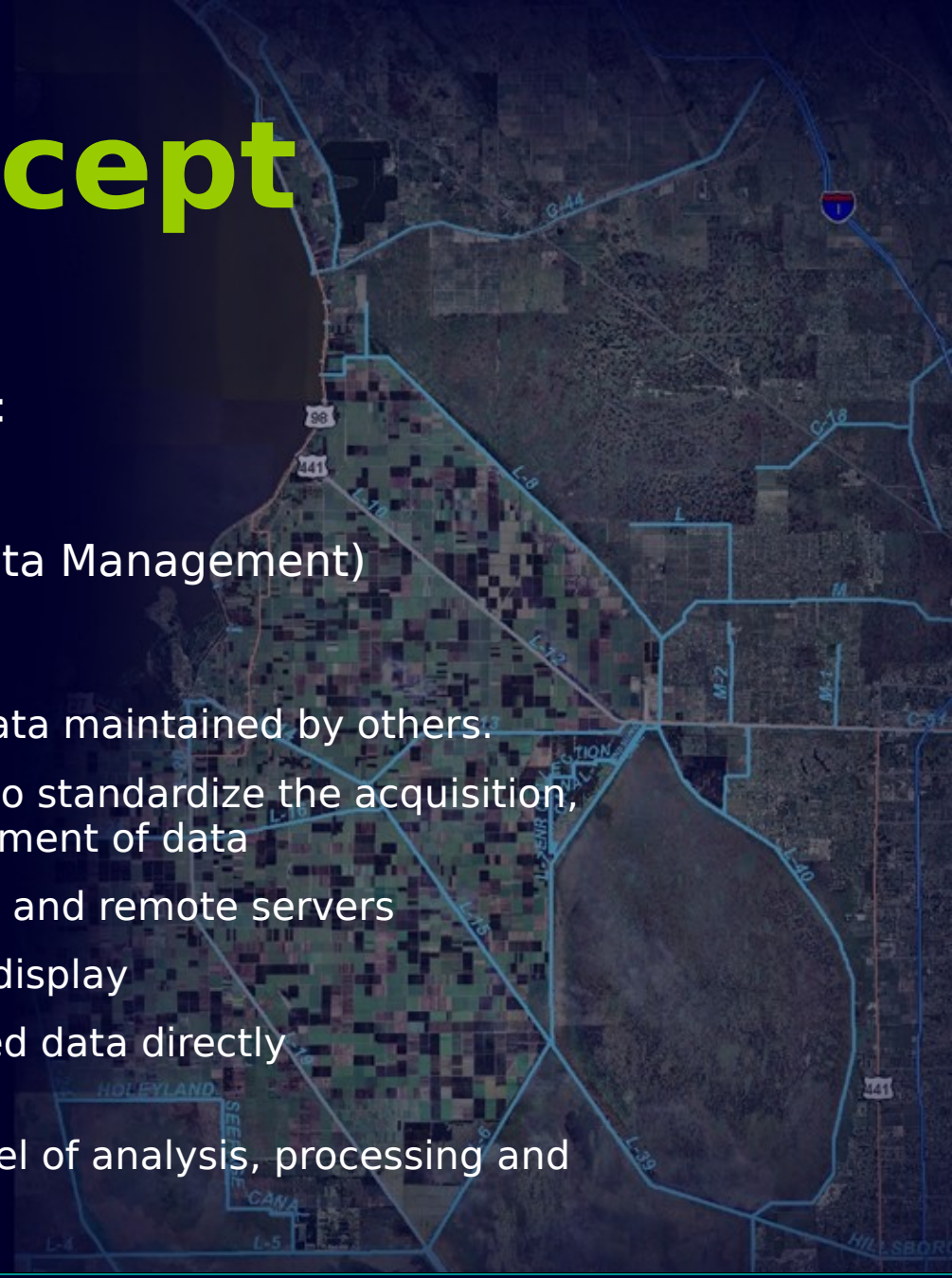


System Concept

Two-fold Approach to Data Access:

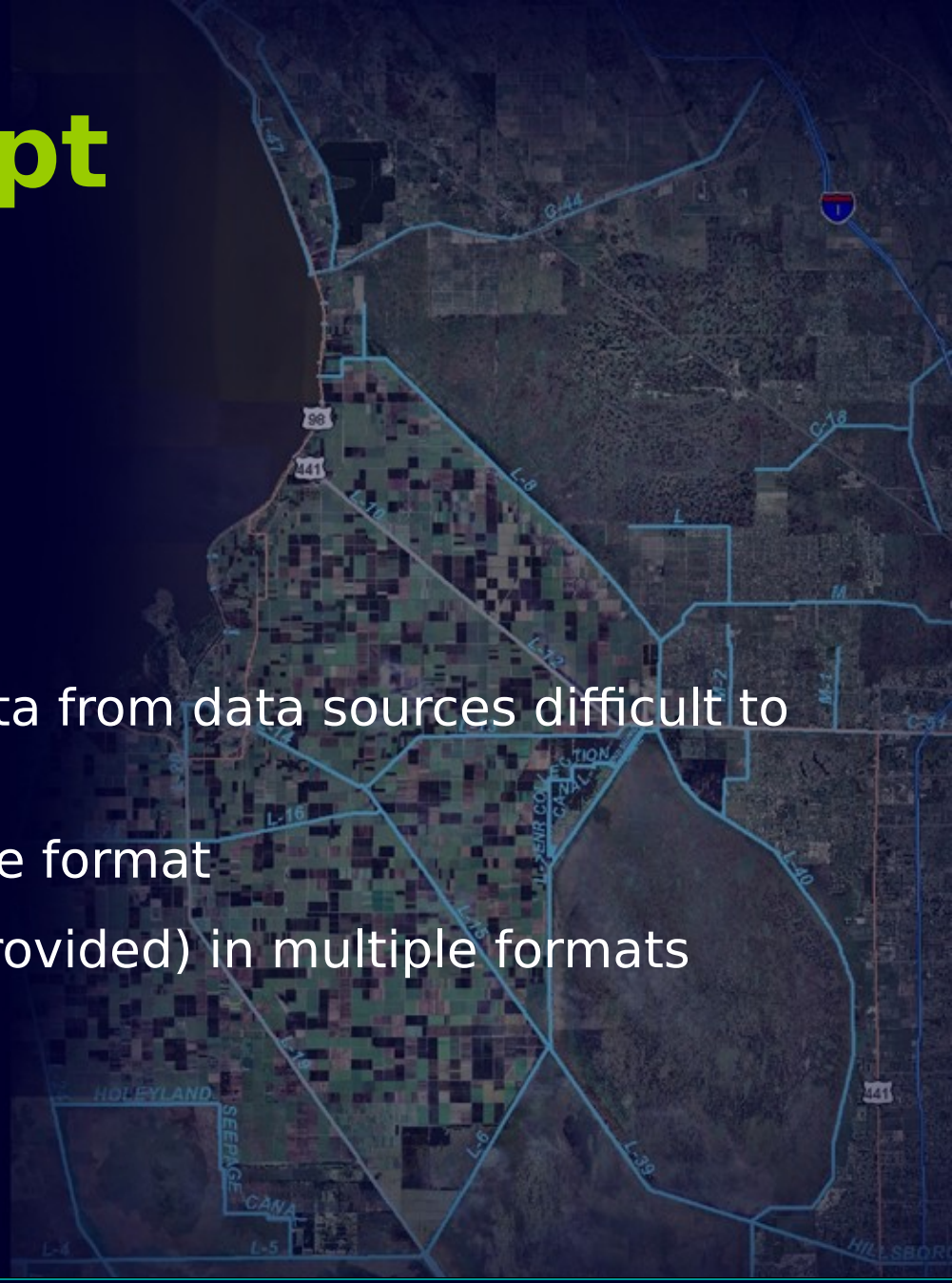
- DataNet (Virtual Web-Based Data Management)

  - ✓ Central viewing portal to data maintained by others.
  - ✓ Network-centric approach to standardize the acquisition, dissemination and management of data
  - ✓ Access data stored on local and remote servers
  - ✓ Consistent formatting and display
  - ✓ User downloads of selected data directly from source
  - ✓ Basic & comprehensive level of analysis, processing and translation of data



System Concept (continued)

- Data Repository



- ✓ Local Storage of Data from data sources difficult to access
- ✓ Data Stored in native format
- ✓ Data Provisioned (provided) in multiple formats

System-Wide Water SWWRP Resources Program

US Army Corps of Engineers
Jacksonville District

DBHYDRO: SFWMD
(West Palm Beach)

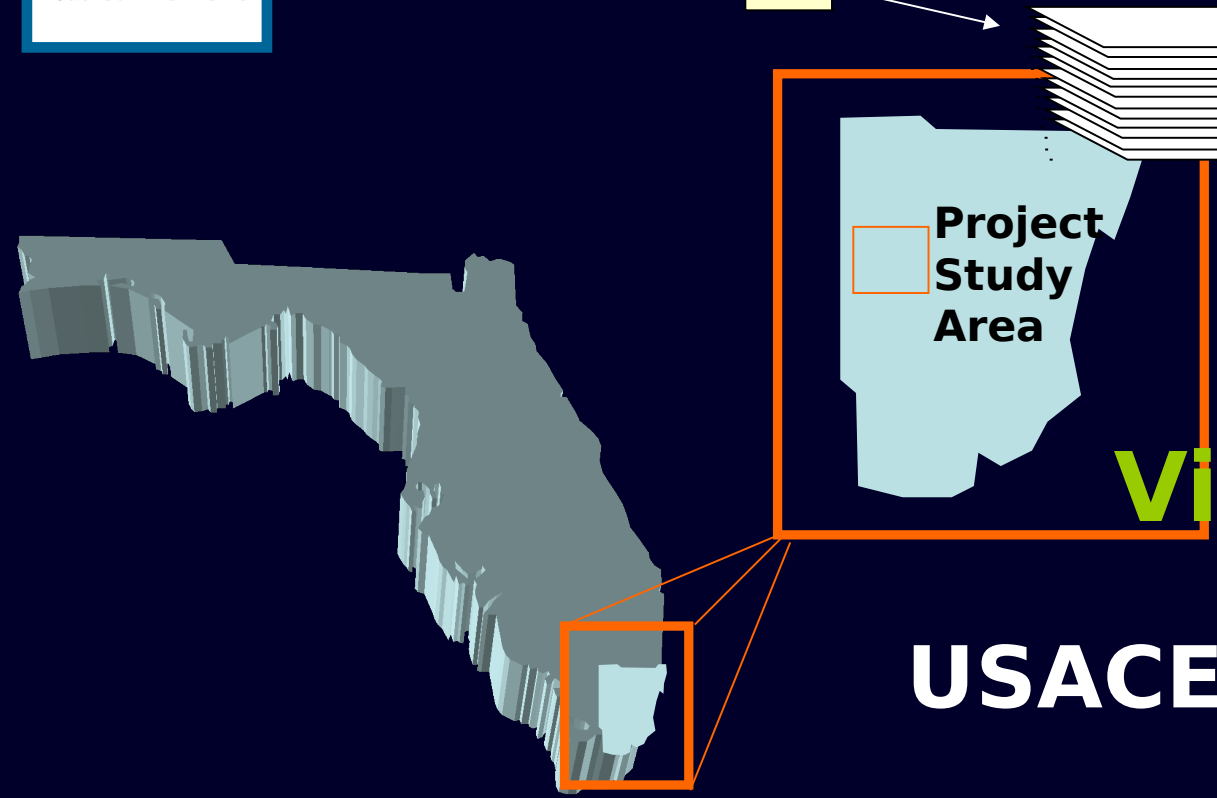
STORET: EPA

(Atlanta)

USGS: wq, Stage etc.
(Columbia, SC)

Project Design,
Project History
Project Related Dat
(USACE, SFWMD, e

Integrated
GIS Database



Virtual Portal

Available to USACE,SFWMD,EPA, DOI, etc

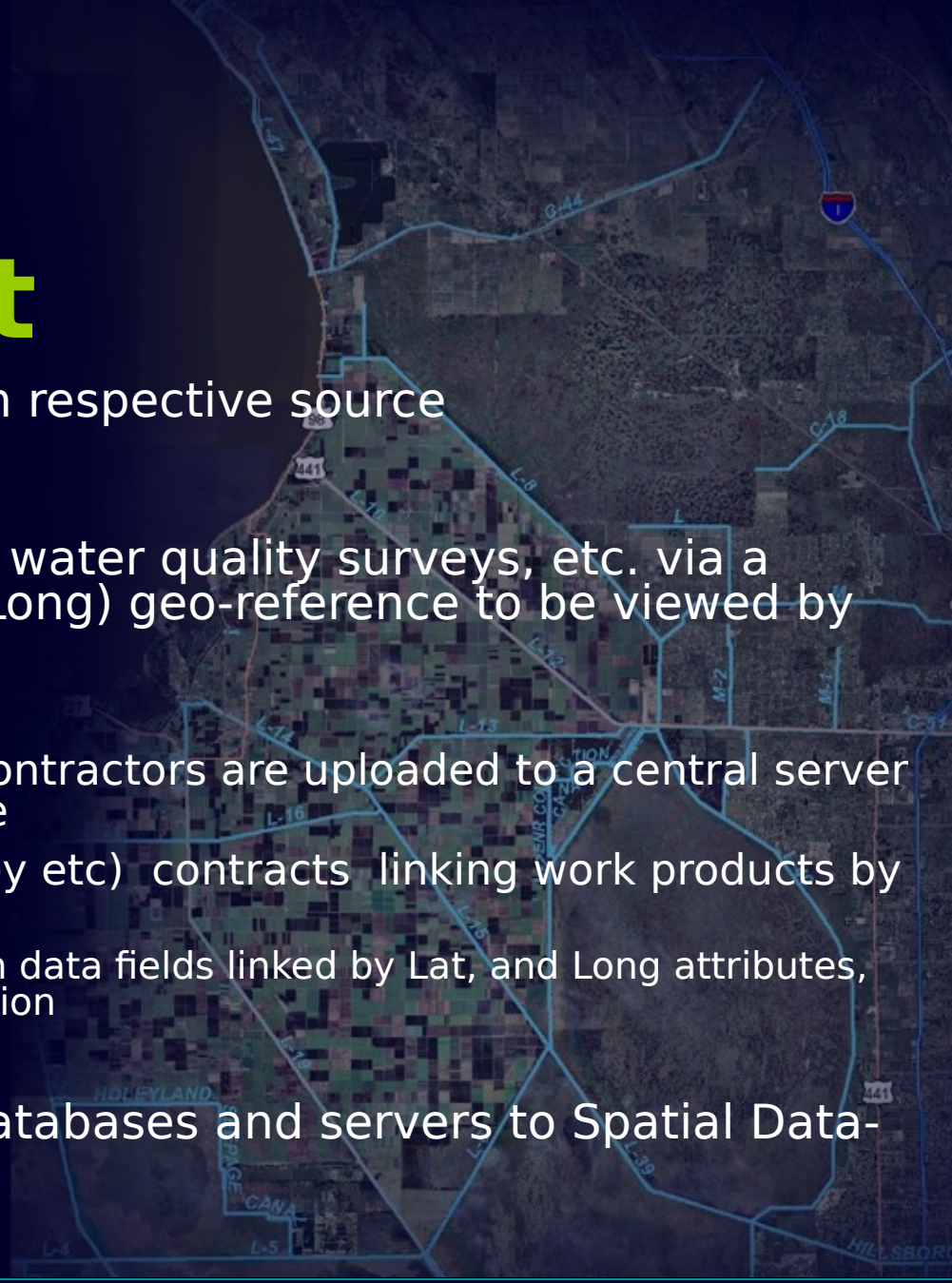
Virtual Data Management

- View Agency Databases from respective source

- Link project maps, geo-tech, water quality surveys, etc. via a latitude and longitude (Lat, Long) geo-reference to be viewed by virtual portal

  - Project data generated by contractors are uploaded to a central server with Lat, Long geo-reference
  - Structure (monitoring, survey etc) contracts linking work products by Lat, Long
    - Deliverable require common data fields linked by Lat, and Long attributes, include links to Documentation

- Integrate and link existing databases and servers to Spatial Data-on-Demand Virtual Portal



Virtual Data Management

- Utilize the web services to access local and remote data

- Analysis subroutines integrated to data downloads for time step comparisons or model inputs (discrete points , imagery, etc.)

Project Data Example

- History of environmental change
- NEPA
  - Water Quality
  - Endangered and Threatened Species
  - HTRW
  - Cultural Resources
  - Wetlands
  - Land Use
- RECOVER (Regional)
  - WQ Monitoring
  - Vegetation
  - Habitat/Species

Endangered and Threatened Species

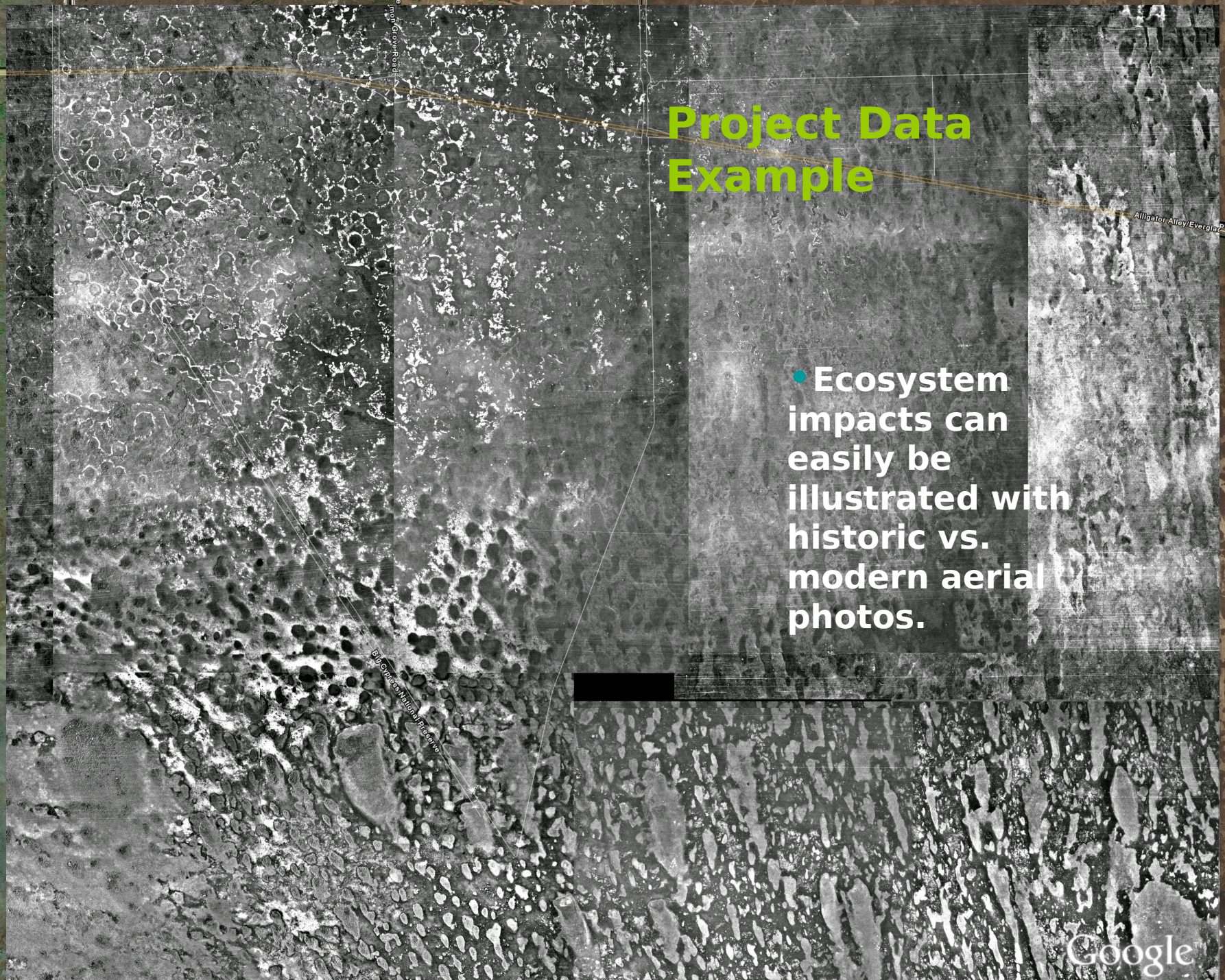
Cultural Resources

WQ Monitoring

Vegetation

Projects

- Name
- Project Boundaries
- Real Estate
- Project features
- Design
- Geotech Surveys
- Model Run results
- H & H
- Project Stats (Capacities, Flow Pattern etc)

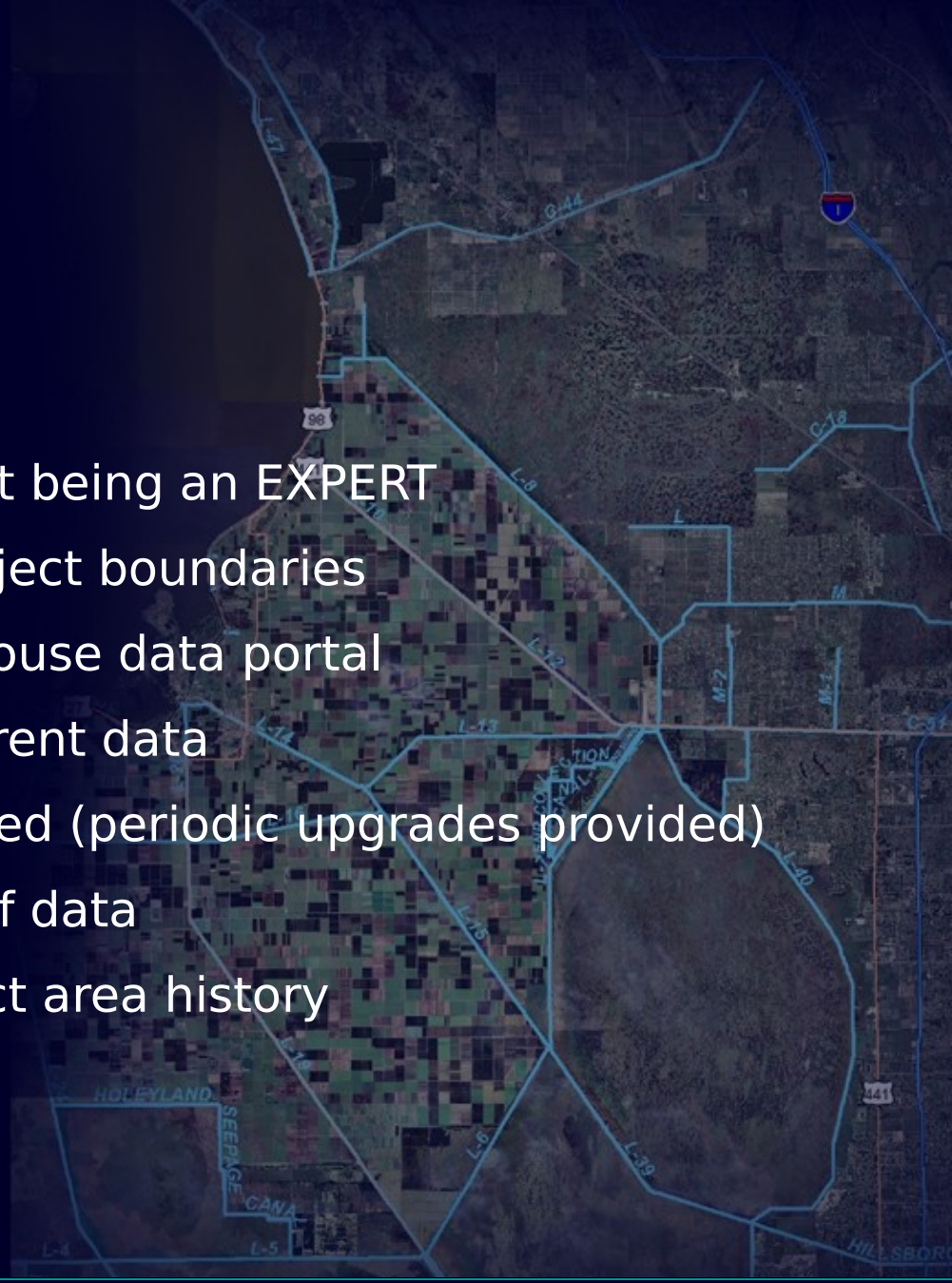


Project Data Example

- Ecosystem impacts can easily be illustrated with historic vs. modern aerial photos.

Benefits

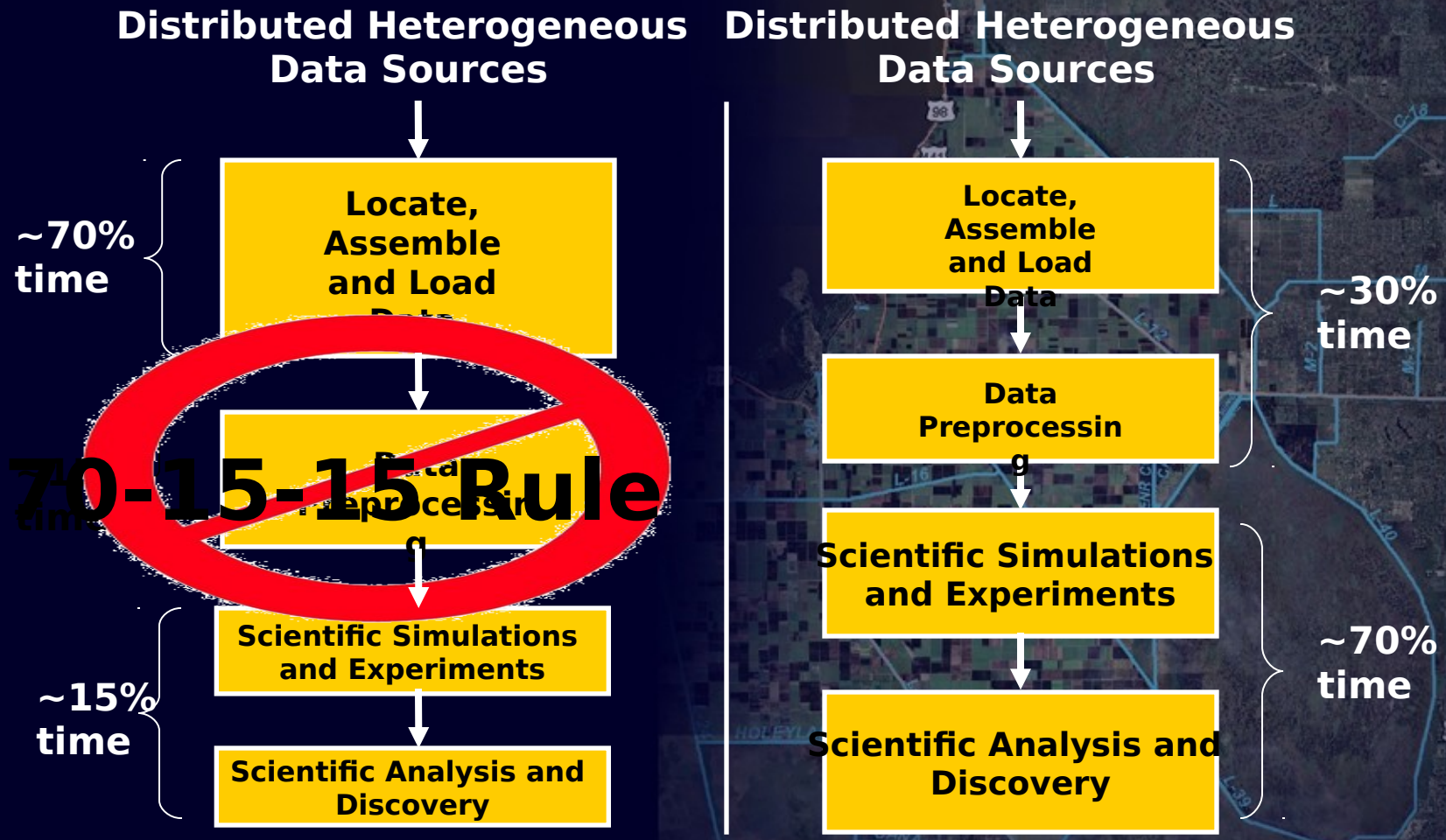
- Multi-Agency access
- Quick access to data without being an EXPERT
- Delivers data tailored to project boundaries
- Provides a central clearinghouse data portal
- Provides access to most current data
- Minimal maintenance required (periodic upgrades provided)
- Prevents costly replication of data
- Streamlines access to project area history



Benefits (continued)

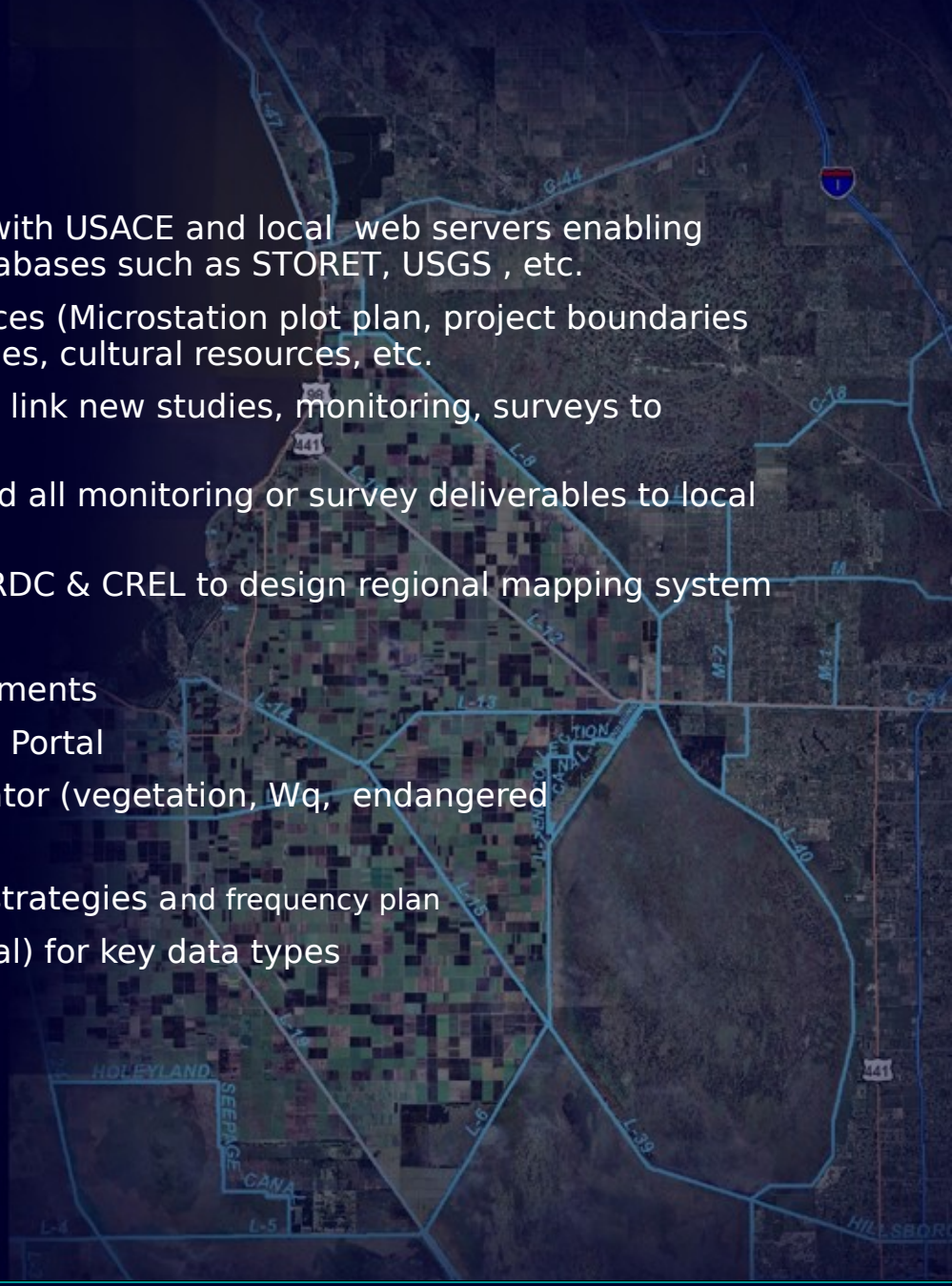
- Minimal additional cost to districts for federal data
- Helps identify data gaps by providing a snapshot of available data
- Works through firewalls, is encrypted, and operates with authentication
- Built on a scalable model to accommodate new data sources
- Web services enhances existing data management systems
- Totally compatible with existing & future databases
- Build global library of analytical tools
  - Mapping, time-step changes in WQ, vegetation, flora and fauna, etc.

Benefits (visual)



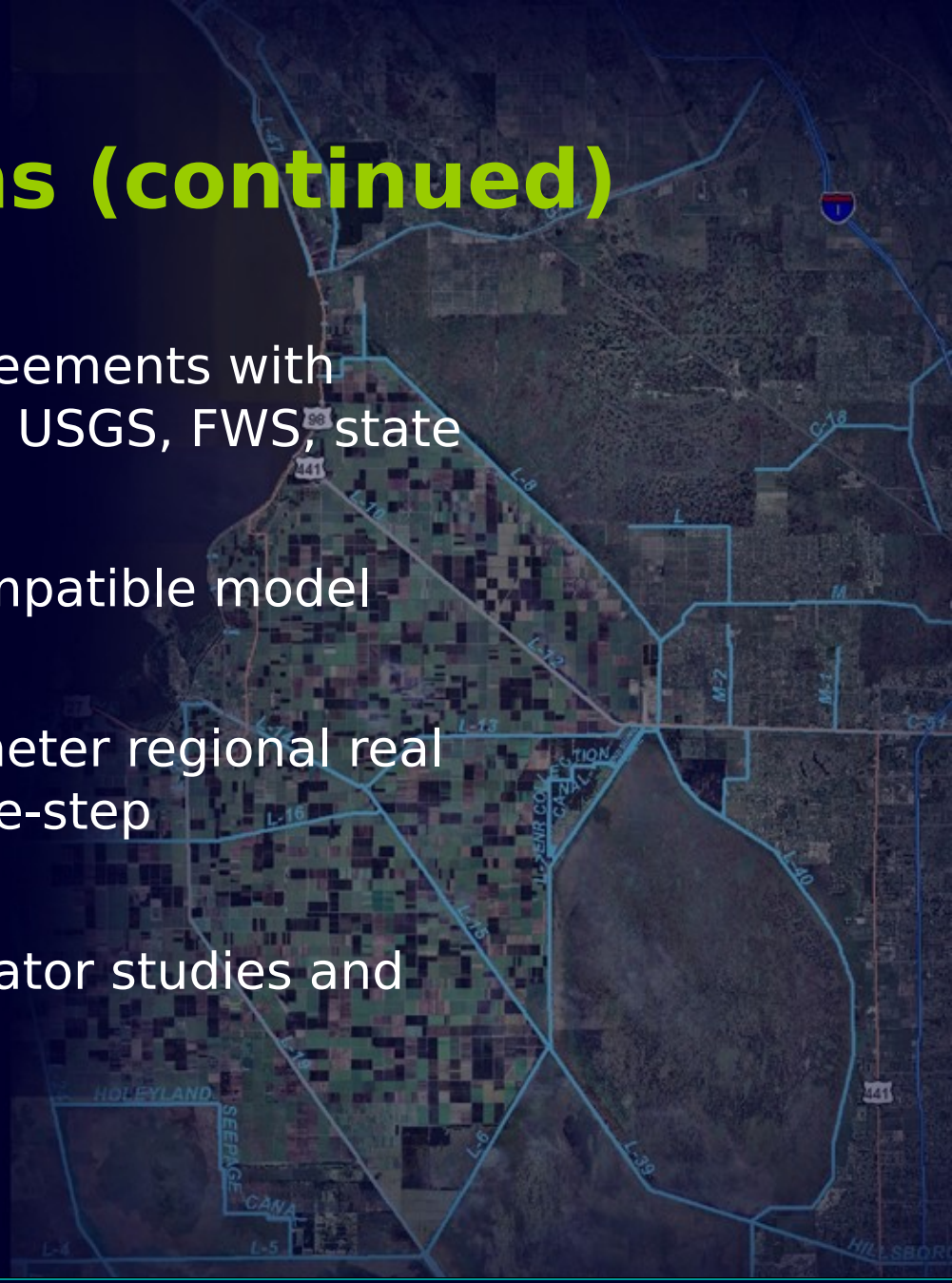
Recommendations

- Existing Data: Integrate Corpsglobe tools with USACE and local web servers enabling direct links to water quality and other databases such as STORET, USGS , etc.
  - Identify and link to key local data sources (Microstation plot plan, project boundaries files, CERCLA, RCRA, endangered species, cultural resources, etc.
- Future Project Data: Develop local tools to link new studies, monitoring, surveys to latitude and longitude attributes
  - Add contractual requirements to upload all monitoring or survey deliverables to local server
- Manage Imagery Data: Collaborate with ERDC & CREL to design regional mapping system
  - Server Format
  - Uploading protocol contractual requirements
  - Interface with Data-on-Demand Virtual Portal
  - Develop time-step parameter comparator (vegetation, Wq, endangered species etc.
  - Develop regional imagery acquisition strategies and frequency plan
- Build time-step comparator library (national) for key data types



Recommendations (continued)

- Establish service level agreements with various data sources (EPA, USGS, FWS, state etc.)
- Establish data formats compatible model input requirements
- Design multi-media/parameter regional real time contour mapping time-step comparators
- Integrate regional comparator studies and models

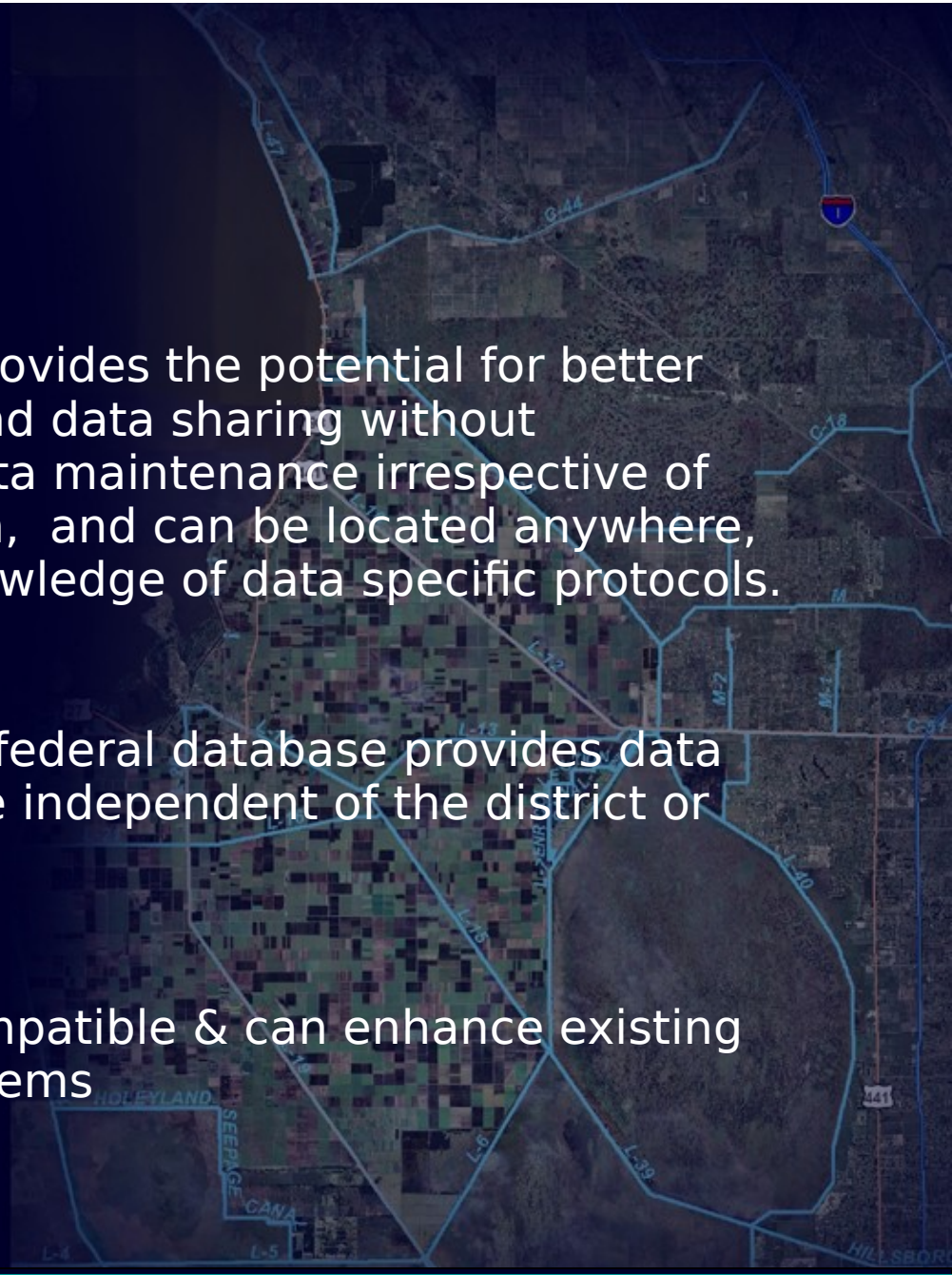


Conclusion

- Virtual Data Management provides the potential for better interagency collaboration and data sharing without duplication, or additional data maintenance irrespective of data type, database location, and can be located anywhere, used by anyone without knowledge of data specific protocols.

- Any web service linked to a federal database provides data access Corps & Agency-wide independent of the district or Agency user.

- The Corpsglobe Portal is compatible & can enhance existing Database Management Systems



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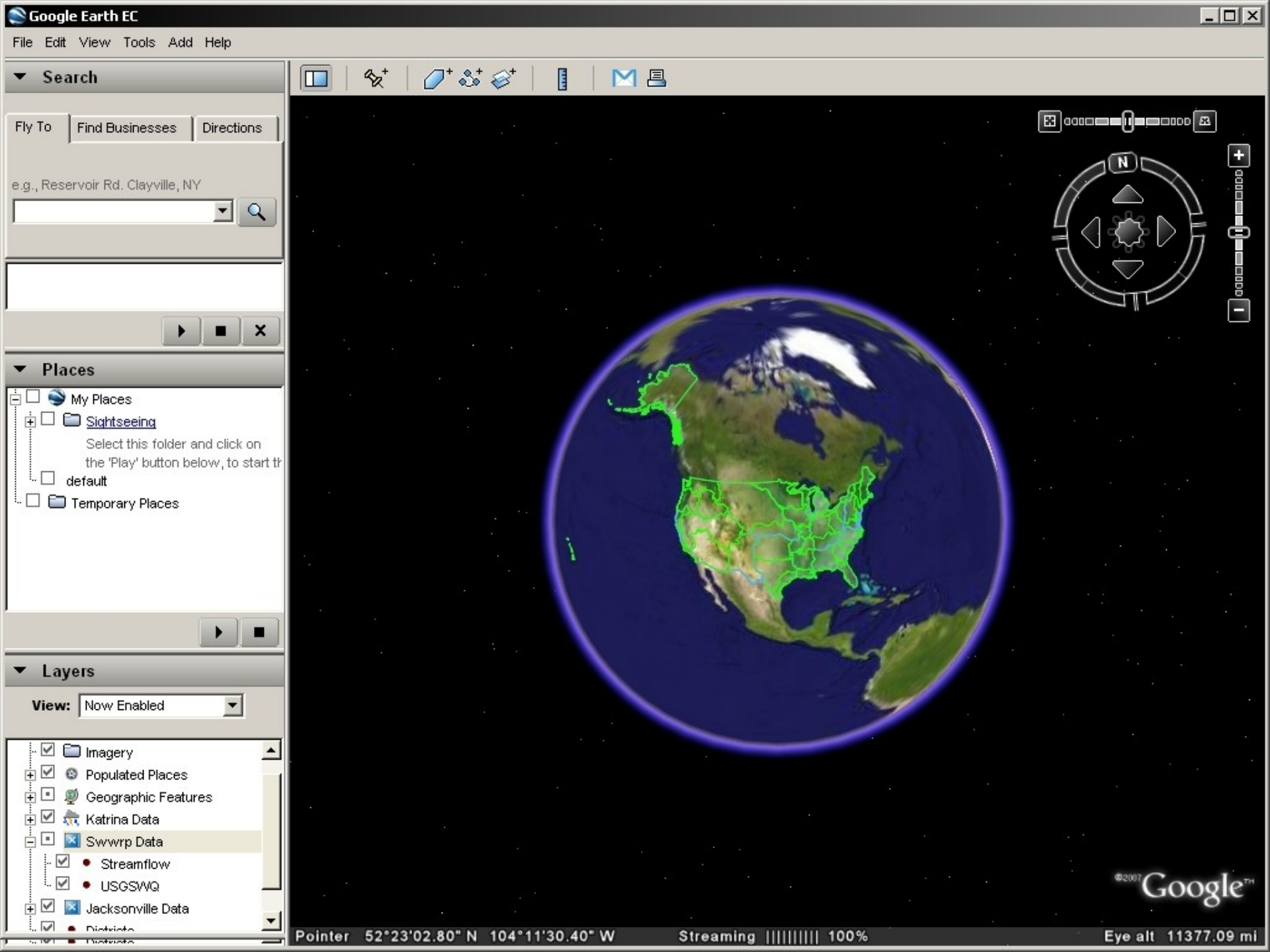
http://corpsglobe.usace.army.mil/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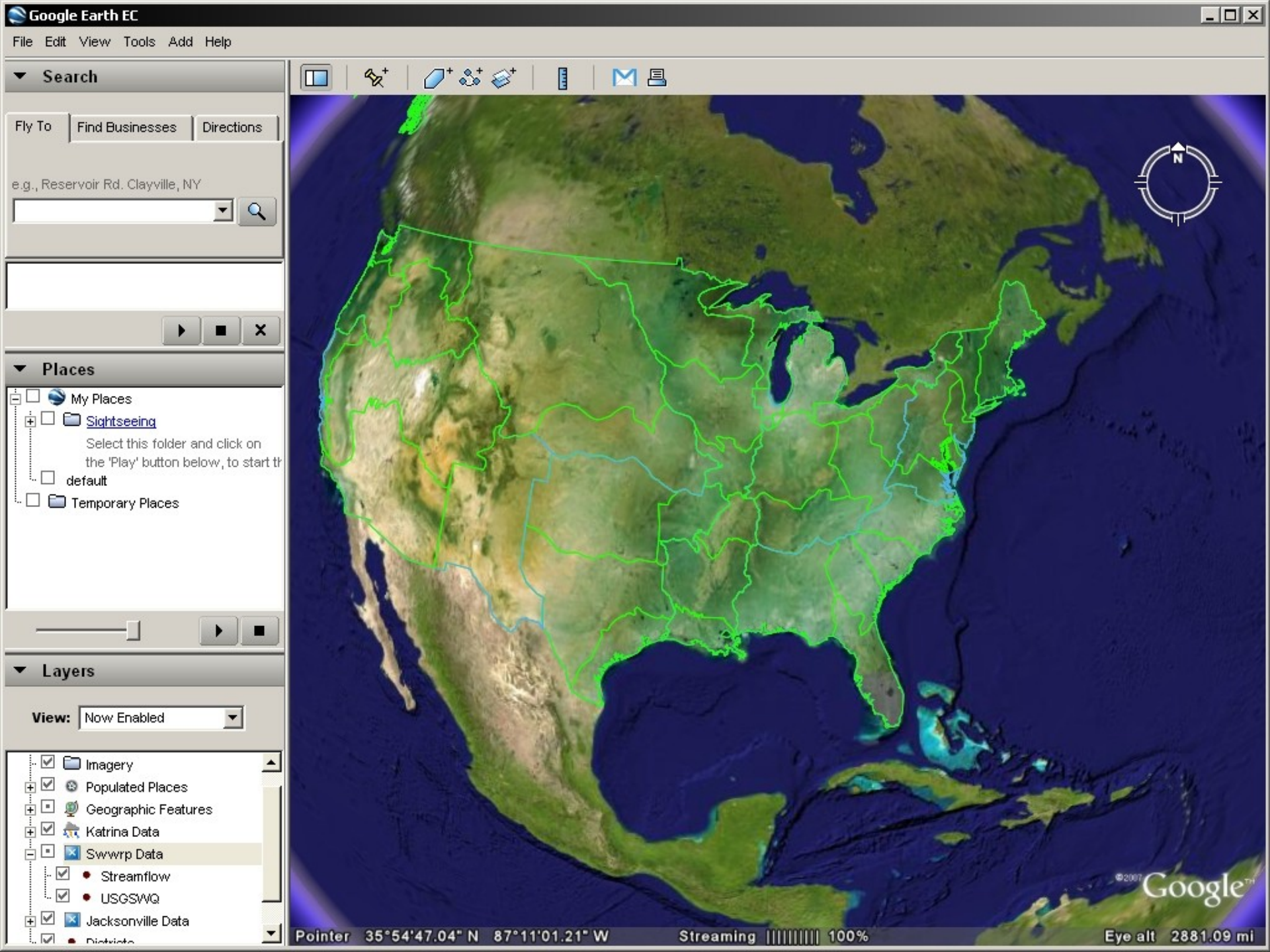
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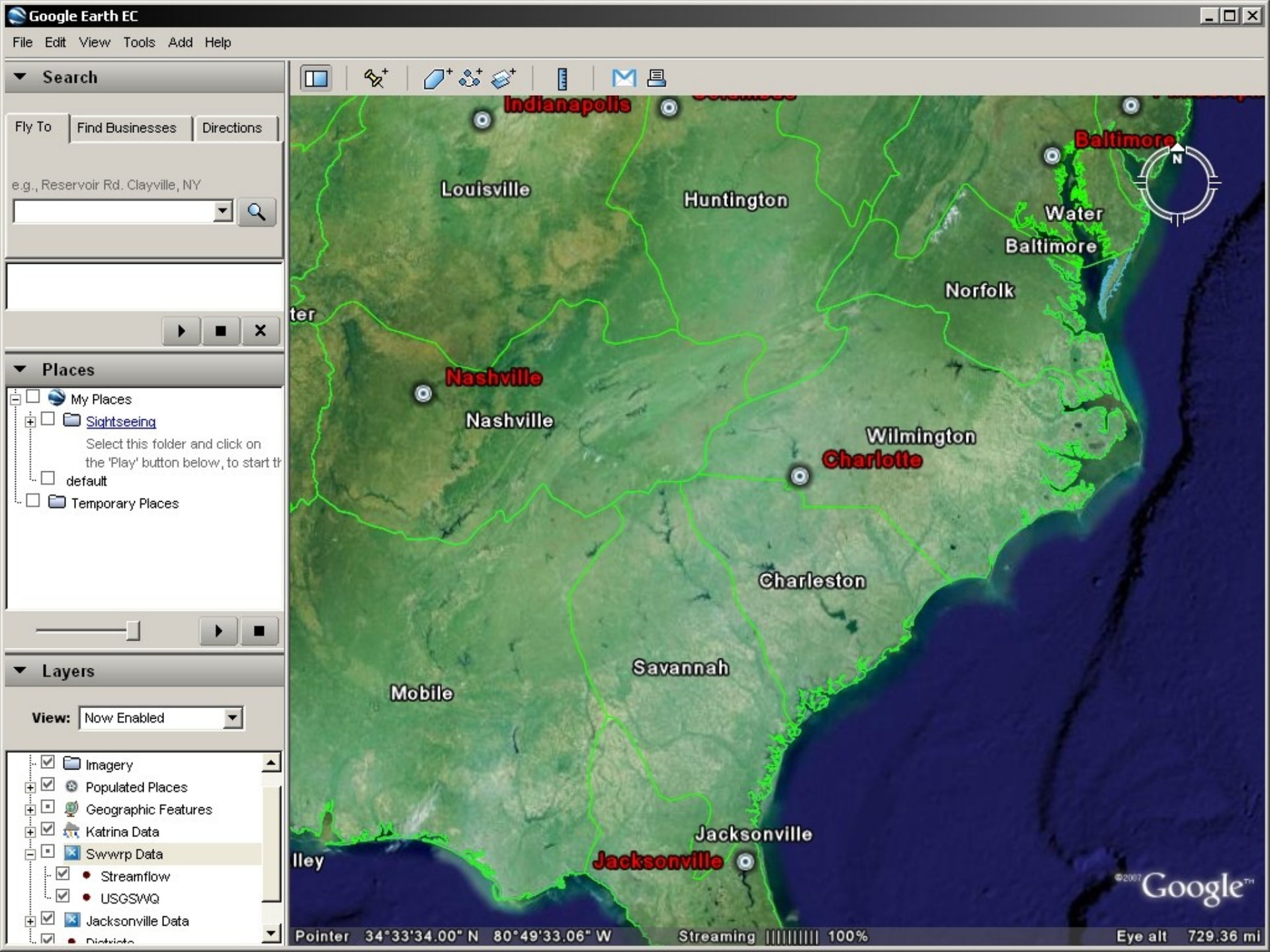
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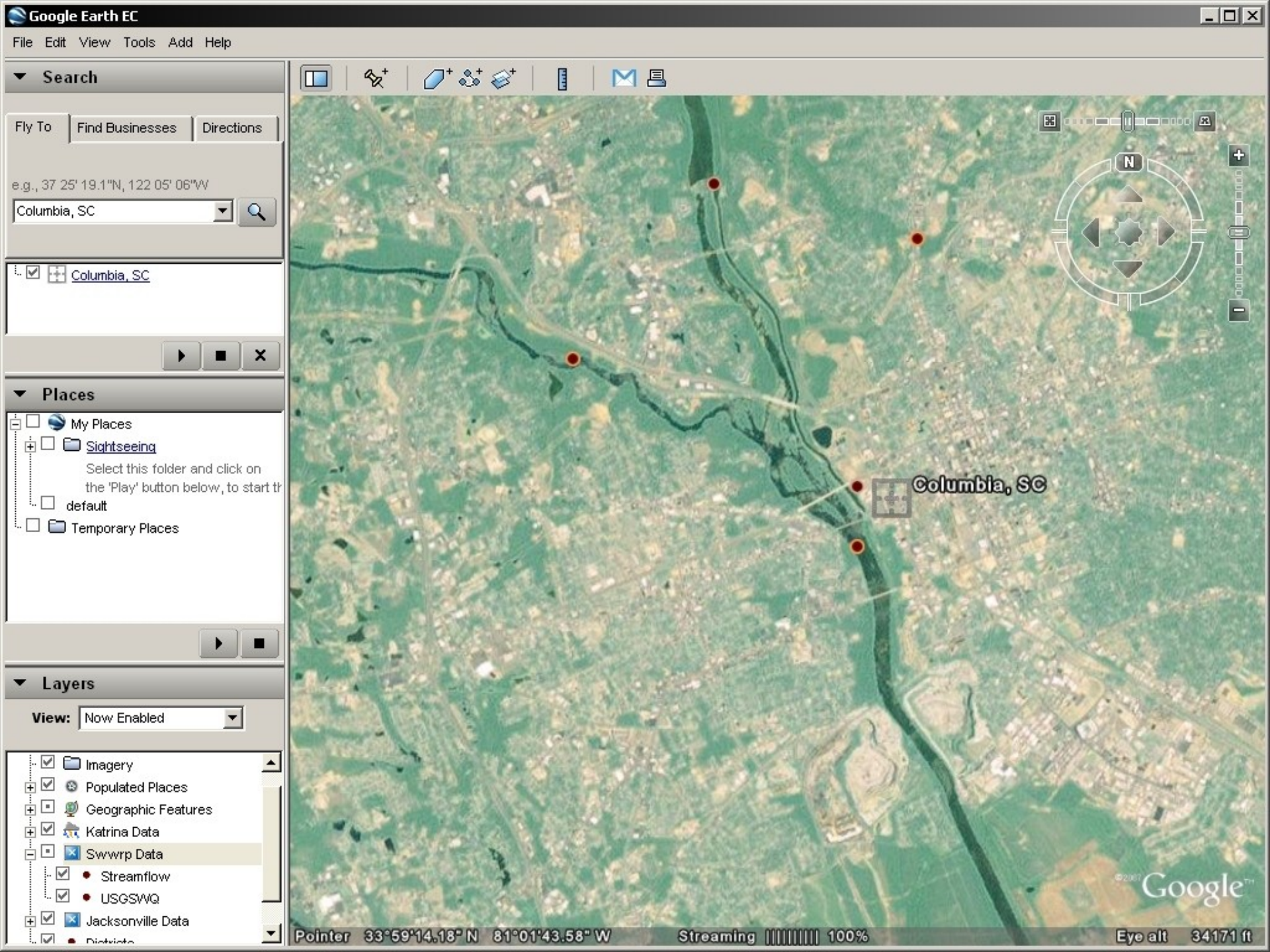
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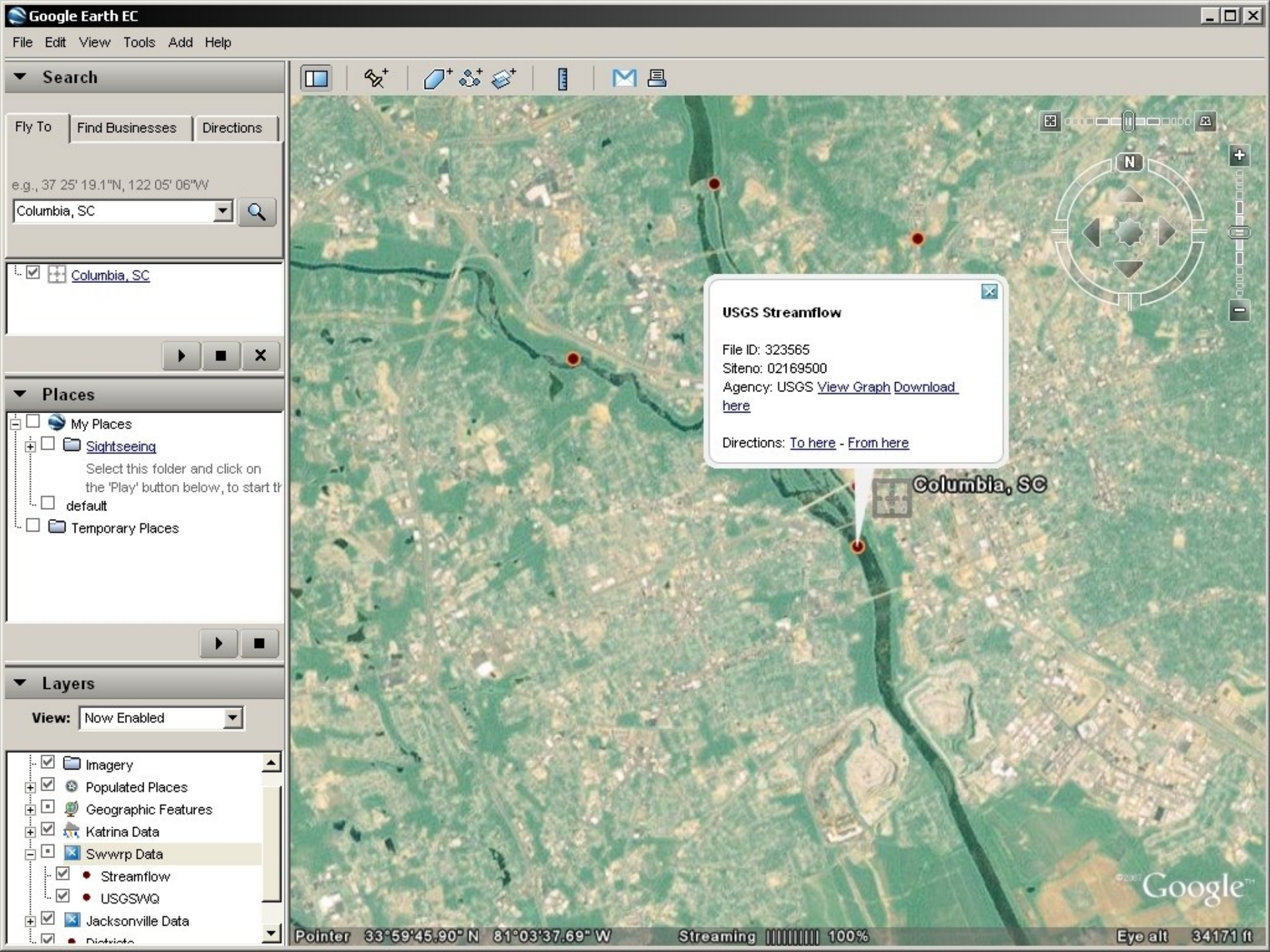
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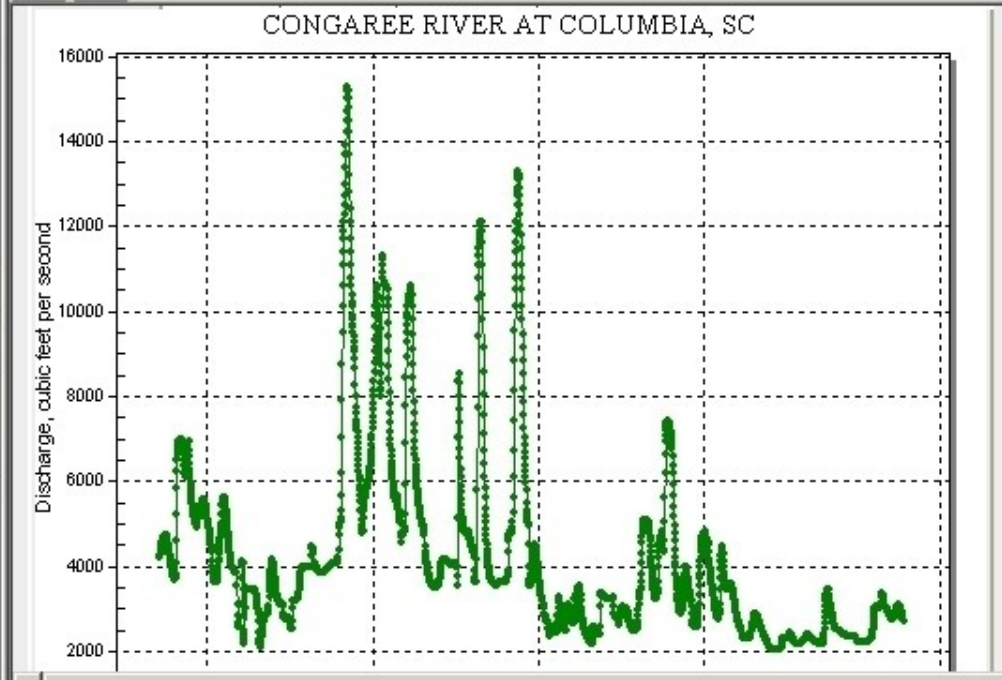
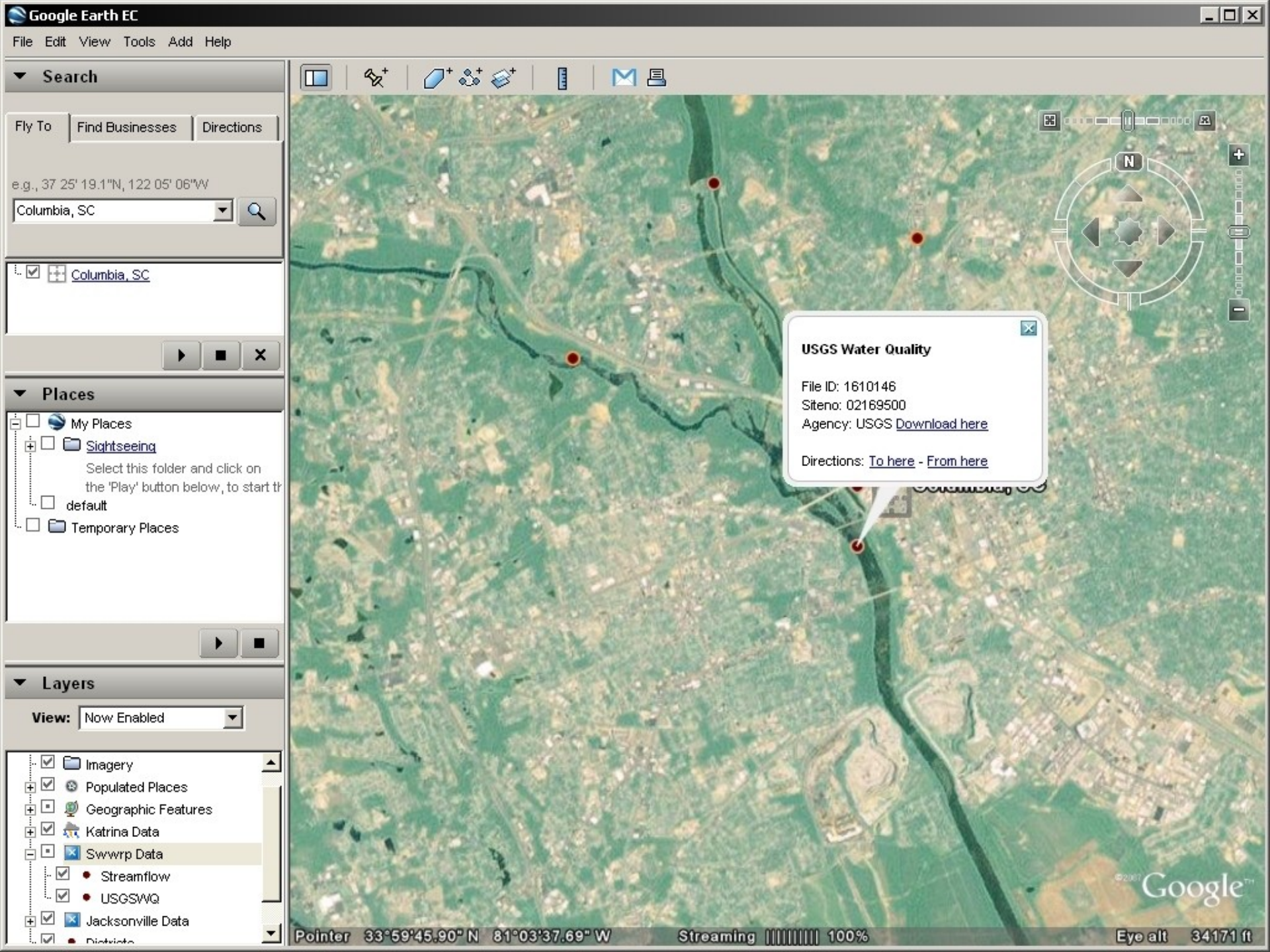


Statistics

Arithmetic Mean	4182
Geometric Mean	3768
Maximum	1.53E+04
Minimum	2020
Standard Deviation	2249
Coefficient of Variation	54%
10%	2320
25%	2720
Median, 50%	3540
75%	4730
90%	6950
# of Observations	3005
# Censored	0

NWIS Time Series Analyst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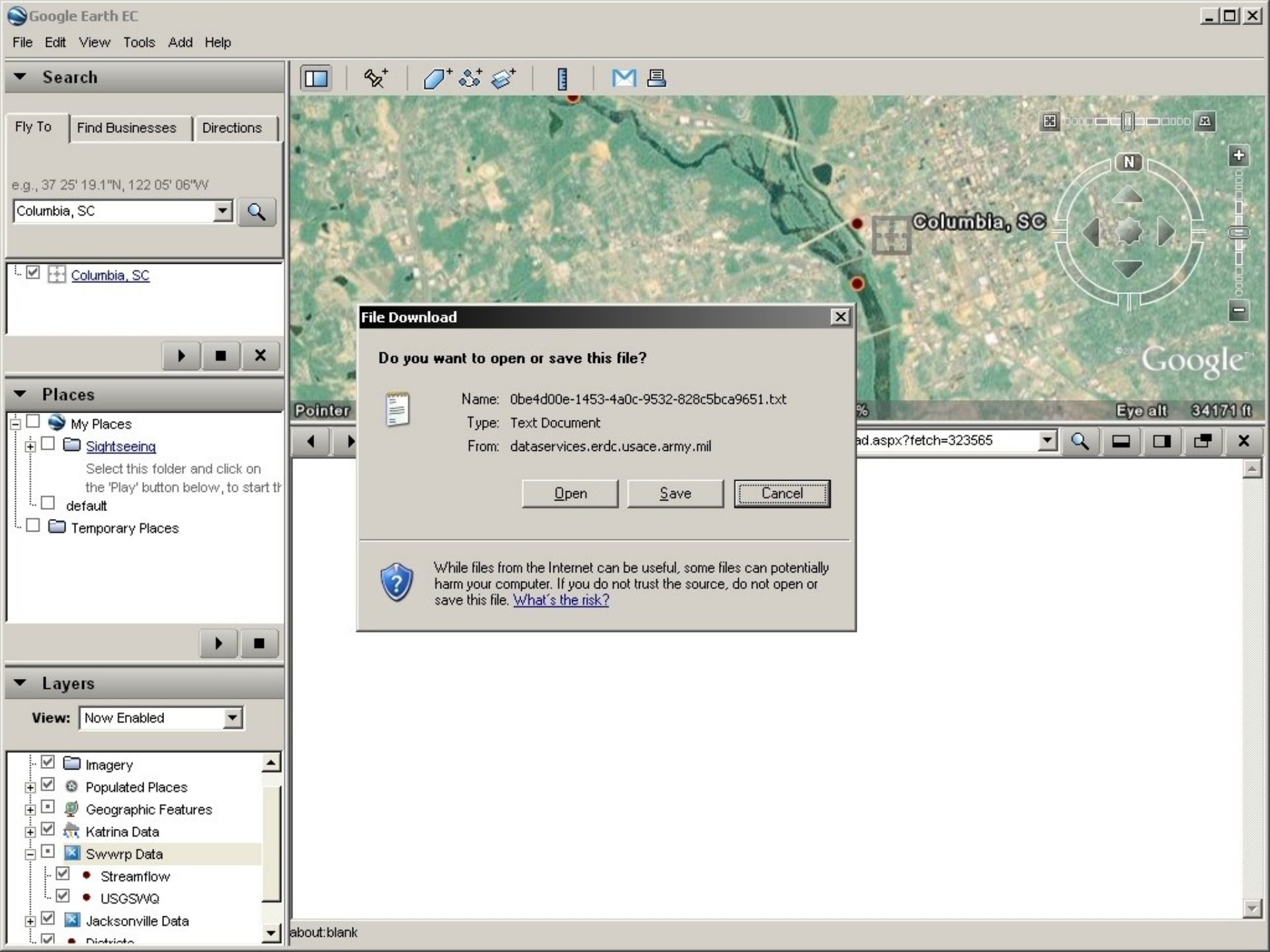
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